```
/PAL III
/PART V
/PAGE 36
*2000


/ROUTINE TO HANDLE ORIGINS
/LENGTH:  13 REGISTERS

STAR,   PUSHJ           /ORIGIN SETTING, GO ASSEMBLE EXPRESSION
        CSYM            /ADDRESS FOR PUSHJ HANDLER
        TAD BINW                /PICK UP ASSEMBLED BINARY WORD
        DCA AACT                /RESET ABSOLUTE ADDRESS COUNTER
        DCA INFO                /SAY NO TO MAIN
        CMA             /WHICH PASS IS THIS?
        TAD PF          /DO NOT PUNCH ON PASS1 OR PASS3
        SZA CLA
        POPJ            /EXIT ON PASS1 OR PASS3
        CLL CML                 /SET LINK FOR ORIGIN PUNCH IN BINP
        TAD AACT                /PICK UP ORIGIN
        JMS I PUNI      /GO PUNCH IT
        POPJ            /EXIT


PSHLST, 0               /PUSH DOWN LIST
*,+13
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/PAGE 37
/CHECK ROUTINE

/DISTINGUISHES BETWEEN NUMBERS, LETTERS, SPECIAL CHARACTERS
/NUMBERS HAVE CODES BETWEEN 260 AND 271
/LETTERS HAVE CODES BETWEEN 301 AND 332
/ANY CHARACTER NOT A NUMBER OR A LETTER IS A SPECIAL CHARACTER
/HOWEVER, SPECIAL CHARACTERS ARE MEANT TO INCLUDE ONLY
/PLUS, MINUS, COMMA, EQUAL, STAR, PERIOD, SPACE, RETURN, DOLLAR

/EXIT TO SPSHUL IF CHAR IS A SPECIAL CHARACTER
/EXIT TO CALLING ADDRESS+1 IF CHAR IS NUMBER
/EXIT TO CALLING ADDRESS +2 IF CHAR IS LETTER

/LENGTH: 23 REGISTERS

NCHEK,  0
        TAD CHAR                    /IS CHAR < 260?
        TAD M260                    /GET CHAR-260
        SPA
        JMP I SPECI         /CHAR<260,SPECIAL CHARACTER
        TAD M12                     /IS CHAR<272?
        SPA                 /FORM CHAR-272
        JMP NUMBEX          /YES, 260<CHAR<272
        TAD M7              /IS CHAR<301?
        SPA
        JMP I SPECI         /NO,CHAR IS A SPECIAL CHARACTER
        TAD M32                     /IS CHAR<333?
        SMA
        JMP I SPECI         /NO, CHAR IS A SPECIAL CHARACTER
LETREX, ISZ NCHEK           /EXIT FOR LETTERS
NUMBEX, CLA
        TAD CHAR                    /TRIM CHAR TO SIX BITS
        AND SL6
        DCA CHAR                    /PUT IT BACK
        JMP I NCHEK         /EXIT
M260,   -0260
M7,     -0007
M32,    -0032
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/PAGE 38
/SYMBOL TABLE SEARCH ROUTINE
/EXITS TO CALLING ADDRESS+1 IF SYMBOL NOT IN TABLE
/EXITS TO CALLING ADDRESS+2 IF SYMBOL IN TABLE
/ENTRY ADDRESS IS RETURNED IN AC IF NOT IN TABLE
/ADDRESS OF VALUE IN AC IF IN TABLE
/LENGTH: 41 REGISTERS
SYMGET, 0
        TAD SATAB
        DCA SORT2
        TAD SORT2
        IAC
        DCA TEM3
LOOP,   TAD SPNT                    /END OF SYMBOLS YET?
        CLL CMA IAC
        TAD SORT2
        SNA CLA                     /SKIP IF NOT TESTED ALL
        JMP NITBL           /TERMINATE SEARCH, TABLE FULL
        TAD SYMPNT          /GET ADDRESS-1 OF SYM1
        DCA SORT1           /IN AN INDEX REGISTER
        JMS I SYMCMI        /COMPARE TWO SYMBOLS
        JMP INTABL          /THEY MATCH IF RETURN IS HERE
        NOP                 /THEY DON'T MATCH
        ISZ SORT2           /INDEX TO NEXT SYMBOL
        JMP LOOP-3
NITBL,  TAD TEM3                    /CHECK TABLE OVERFLOW
        CIA CLL                     /COMPARE AGAINST PAGE
        TAD RBGN                    /SYMBOLS STOP AT 6600
        SZL CLA
        JMP NTEXIT          /OK, ROOM FOR THIS SYMBOL
        TAD SYMPNT
        IAC                 /ADDRESS OF SYMBOL
        PUSH
        TAD C3              /CODE FOR ST IS 3
        PUSHJ               /GO TO ERROR ROUTINE
        ERROR1
        HLT                 /HALT ON S.T. ERROR
        JMP .-1                     /NO RECOVERY
NTEXIT, TAD TEM3                    /ADDRESS TO STORE IN
        JMP I SYMGET        /EXIT
INTABL, TAD I SORT2
        DCA SYMVAL          /PUT IT IN SYMVAL
        TAD TEM3                    /RETURN WITH ADDRESS
        TAD C3
        ISZ SYMGET
        JMP I SYMGET        /EXIT

SYMPNT, SYM1-1
SATAB,  OPTABL-1
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/PAGE 39
/ROUTINE TO HANDLE COMMAS

/LENGTH: 22 REGISTERS

SYMSTO, TAD PF          /WHICH PASS IS THIS?
        SZA CLA
        JMP EXIT                /IGNORE SYMBOL DEFINITIONS, PAS2
        TAD I TEM3      /PICK UP THE FIRST WORD OF SYMBOL
        SPA CLA                 /HAS IT ALREADY BEEN DEFINED?
        JMP DEFIN       /NO, GO PROCESS IT
        TAD TEM3                /YES, COMPLAIN ABOUT A DOUBLE TAG
        PUSH            /SAVE ENTRY ADDRESS OF SYMBOL
        TAD C2          /CODE FOR D.T. IS 2
        PUSHJ
        ERROR1          /ERROR ROUTINE
        JMP EXIT                /DON'T PROCESS IT
DEFIN,  TAD I TEM3      /MAKE THE SYMBOL DEFINED
        AND MASK
        DCA I TEM3      /PUT IT BACK
        ISZ TEM3                /INCREMENT POINTER TO VALUE
        ISZ TEM3
        ISZ TEM3
        TAD AACT                /GET THE CURRENT LOCATION
        DCA I TEM3      /STORE IT AS THE VALUE OF THE WORD
EXIT,   DCA INFO                /CLEAR INFO
        JMP I FFF       /BACK TO CSYM

/THE FIELD PSEUDO-OP
/PUNCHES A WORD IN THE FORM
/11 XXX 000
/LENGTH: 14 REGISTERS

FLD,    PUSHJ           /EVALUATE EXPRESSION
        CSYM            /ADDRESS
        TAD PF          /WHICH PASS IS THIS?
        SPA SNA CLA
        JMP .+7                 /NOT PASS 2
        TAD BINW                /IT IS PASS 2
        AND SL3                 /JUST THREE BITS
        CLL RTL                 /MOVE LEFT 3 PLACES
        RAL
        TAD KON6                /BITS FOR LOADER
        JMS I BBB       /PUNCH IT
        DCA INFO                /NOTHING FOR MAIN
        POPJ            /EXIT
KON6,   0300            /BITS FOR LOADER

L20,
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*2200
/PAGE 40

/ROUTINE TO FIX MEMORY REFERENCE INSTRUCTIONS
/LENGTH: 11 REGISTERS
/CAN BE GIVEN ONLY AFTER EXPUN

FIXY,   PUSHJ           /RECURSIVE CALL TO MAIN PROCESSOR
        CSYM            /ADDRESS FOR PUSHJ HANDLER
        DCA INFO
        TAD PF          /WHICH PASS IS THIS?
        SZA CLA                 /IGNORE FIX ON PASS2 OR PASS3
        POPJ            /EXIT
        TAD I MCRIPA    /ONE MORE MEMORY
        TAD M4          /REFERENCE INSTRUCTION
        DCA I MCRIPA
        POPJ            /EXIT
MCRIPA, MICRP
/ROUTINE TO HANDLE PARAMETER ASSIGNMENTS
/ALLOWS FOR MULTIPLE DEFINITIONS OF THE TYPE A=B=C=...=1
/LENGTH: 28 REGISTERS

EQUAL,  TAD TEM3                /GET ENTRY ADDRESS OF SYMBOL
        DCA TEM5                /SAVE IT IN A SPECIAL TEMP REGISTER
        TAD I TEM5      /MAKE THE SYMBOL DEFINED
        CLL
        SMA
        CML             /ALREADY DEFINED C(L)=1
        AND MASK
        DCA I TEM5      /PUT IT BACK
        SZL
        JMP EQERR       /REDEFINING
DEFGO,  TAD C3
        TAD TEM5
        PUSH            /PUSH IT DOWN FOR POSSIBLE RECURSION
        PUSHJ           /RECURSIVE CALL TO PROCESSOR
        CSYM            /ADDRESS FOR PUSHJ ROUTINE
        POP             /GET THE LATEST SYMBOL VALUE ADDRESS
        DCA TEM5                /PUT IT BACK IN TEM5
        TAD BINW                /PICK UP THE BINARY VALUE
        DCA I TEM5      /STORE IT AS THE VALUE OF THE SYMBOL
        DCA INFO                /NO PUNCHING
        POPJ            /EXIT
EQERR,  TAD TEM5                /ADDRESS OF SYMBOL
        PUSH
        TAD P10
        PUSHJ           /RD CODE=10
        ERROR1          /ERROR TYPE 1
        JMP DEFGO       /NOW DEFINE IT
P10,    0010
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/PAGE 41

/ERROR MESSAGE TABLE
TABLE,  2501            /UA
        0424            /DT
        2324            /ST
        1103            /IC
        1122            /IR
        2017            /PO
        2025            /PU
        2204            /RD

/INCLUSIVE OR ROUTINE
/ENTER WITH ONE ARGUMENT IN C(AC);
/AND WITH THE OTHER IN SYMVAL
/SYMVAL IS UNCAHNGED; ANSWER IN C(AC)
/LENGTH: 7 REGISTERS

IOR,    0
        DCA ITEM                /SAVE C(AC)
        TAD SYMVAL              /PICK UP ARGUMENT
        CMA
        AND ITEM                /PERFORM OPERATION
        TAD SYMVAL
        JMP I IOR               /EXIT

L22,                    /END OF PAGE

        PAUSE
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